

**CATEGORY 9 - PROPULSION SYSTEMS,
SPACE VEHICLES AND RELATED
EQUIPMENT**

**A. SYSTEMS, EQUIPMENT AND
COMPONENTS**

N.B.: For propulsion systems designed or rated against neutron or transient ionizing, see the U.S. Munitions List, 22 CFR part 121.

9A001 Aero gas turbine engines incorporating any of the “technologies” controlled by 9E003.a, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
MT applies to only to those engines that meet the characteristics listed in 9A101	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value
Related Controls: See also 9A101 and 9A991
Related Definitions: N/A
Items:

- a. Not certified for the specific “civil aircraft” for

which they are intended;

Note: For the purpose of the “civil aircraft” certification process, a number of up to 16 civil certified engines, assemblies, or components including spares is considered appropriate.

- b. Not certified for civil use by the aviation authorities in Country Group A:1;
c. Designed to cruise at speeds exceeding Mach 1.2 for more than thirty minutes.

9A002 Marine gas turbine engines with an ISO standard continuous power rating of 24,245 kW or more and a specific fuel consumption not exceeding 0.219 kg/kWh in the power range from 35 to 100%, and specially designed assemblies and components therefor.

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: \$5000
GBS: N/A
CIV: N/A

List of Items Controlled:

Unit: Number
Related Controls: N/A
Related Definition: The term “marine gas turbine engines” includes those industrial, or aero-derivative, gas turbine engines adapted for a ship's electric power generation or propulsion.
Items:

The list of items controlled is contained in the ECCN heading.

Reason for Control: NS and AT

9A003 Specially designed assemblies and components, incorporating any of the “technologies” controlled by 9E003.a, for gas turbine engine propulsion systems, as follows (see List of Items Controlled).

Control(s)

Country Chart

NS applies to entire entry NS Column 1

AT applies to entire entry AT Column 1

License Requirements

Reason for Control: NS, AT

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

Control(s)

Country Chart

NS applies to entire entry NS Column 2

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$5000

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls: N/A

Related Definition: N/A

Items:

- a. Controlled by 9A001;
- b. Whose design or production origins are either countries in Country Group D:1 or unknown to the manufacturer.

9A004 Space launch vehicles and “spacecraft”.

License Requirements

List of Items Controlled

Unit: Equipment in number. Components, parts and accessories in \$ value.

Related Controls:

1.) See also 9A104.

2.) Space launch vehicles are under the jurisdiction of the Department of State.

3.) Effective March 15, 1999, all satellites, including commercial communications satellites, are subject to the ITAR. Effective March 15, 1999, all license applications for the export of commercial communications satellites will be processed by the State Department, Office of Defense Trade Controls. Retransfer of jurisdiction for commercial communications satellites and related items shall not affect the validity of any export license issued by the Department of Commerce prior to March 15, 1999, or of any export license application filed under the Export Administration Regulations on or before March 14, 1999, and subsequently issued by the Department of Commerce. Commercial communications satellites licensed by the Department of Commerce, including those already exported, remain subject to the EAR and all terms and conditions of issued export licenses until their stated expiration date. All licenses issued by the Department of Commerce for commercial communications satellites, including licenses issued after March 15, 1999, remain subject to

SI controls throughout the validity of the license. Effective March 15, 1999, Department of State jurisdiction shall apply to any instance where a replacement license would normally be required from the Department of Commerce. Transferring registration or operational control to any foreign person of any item controlled by this entry must be authorized on a license issued by the Department of State, Office of Defense Trade Controls. This requirement applies whether the item is physically located in the United States or abroad.

4.) All other “spacecraft” not controlled under 9A004 and their payloads, and specifically designed or modified components, parts, accessories, attachments, and associated equipment, including ground support equipment, are subject to the export licensing authority of the Department of State unless otherwise transferred to the Department of Commerce via a commodity jurisdiction determination by the Department of State.

5.) Exporters requesting a license from the Department of Commerce for “spacecraft” and their associated parts and components, other than the international space station, must provide a statement from the Department of State, Office of Defense Trade Controls, verifying that the item intended for export is under the licensing jurisdiction of the Department of Commerce. All specially designed or modified components, parts, accessories, attachments, and associated equipment for “spacecraft” that have been determined by the Department of State through the commodity jurisdiction process to be under the licensing jurisdiction of the Department of Commerce and that are not controlled by any other ECCN on the Commerce Control List will be assigned a classification under this ECCN 9A004.

6.) Technical data required for the detailed design, development, manufacturing, or production of the international space station (to include specifically designed parts and components) remains under the jurisdiction of

the Department of State. This control by the ITAR of detailed design, development, manufacturing or production technology for NASA’s international space station does not include that level of technical data necessary and reasonable for assurance that a U.S.-built item intended to operate on NASA’s international space station has been designed, manufactured, and tested in conformance with specified requirements (e.g., operational performance, reliability, lifetime, product quality, or delivery expectations). All technical data and all defense services, including all technical assistance, for launch of the international space station, including launch vehicle compatibility, integration, or processing data, are controlled and subject to the jurisdiction of the Department of State, in accordance with 22 CFR parts 120 through 130.

Items:

a. The international space station being developed, launched and operated under the supervision of the U.S. National Aeronautics and Space Administration. Hardware specific to the international space station transferred to the Department of Commerce by commodity jurisdiction action is also included.

b. Specific items as may be determined to be not subject to the ITAR through the commodity jurisdiction procedure administered by the Department of State after March 15, 1999.

9A005 Liquid rocket propulsion systems containing any of the systems or components controlled by 9A006. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A006 Systems and components specially

designed for liquid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A007 Solid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A008 Components specially designed for solid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A009 Hybrid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A010 Specially designed components, systems and structures for launch vehicles, launch vehicle propulsion systems or “spacecraft”. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A011 Ramjet, scramjet or combined cycle engines and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A012 Non-military unmanned aerial vehicles,

having any of the following characteristics (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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MT applies to non-military unmanned air vehicle systems (UAVs) and remotely piloted vehicles (RPVs) that are capable of a maximum range of at least 300 kilometers (km), regardless of payload.	MT Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value

Related Controls: See the U.S. Munitions List Category VIII (22 CFR part 121).

Related Definitions: N/A

Items:

a. An autonomous flight control and navigation capability (*e.g.*, an autopilot with an Inertial Navigation System); *or*

b. Capability of controlled-flight out of the direct vision range involving a human operator (*e.g.*, televisual remote control).

Note: 9A012 does not control model aircraft.

9A018 Equipment on the International Munitions List.

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and b	RS Column 2
AT applies to entire entry	AT Column 1
UN applies to entire entry	Rwanda

License Exceptions

LVS: \$1500, except N/A for Rwanda
 GBS: N/A
 CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value

Related Controls: (a) Parachute systems designed for use in dropping military equipment, braking military aircraft, slowing spacecraft descent, or retarding weapons delivery; AND (b) Instrument flight trainers for combat simulation are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)

Related Definition: This entry controls parachute systems designed for use in dropping personnel only.

Items:

- a. Military trainer aircraft bearing “T” designations:

- a.1. Using reciprocating engines; or
- a.2. Turbo prop engines with less than 600 horse power (h.p.);
- a.3. T-37 model jet trainer aircraft; and
- a.4. Specially designed component parts.
- b. Vehicles specially designed or modified for military purposes. (See §770, Interpretation 8)
- c. Pressure refuelers, pressure refueling equipment, and equipment specially designed to facilitate operations in confined areas; and ground equipment, n.e.s, developed specially for military aircraft and helicopters, and specially designed parts and accessories, n.e.s.;
- d. Pressurized breathing equipment specially designed for use in military aircraft and helicopters;
- e. Military parachutes and complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use;
- f. Military instrument flight trainers, except for combat simulation; and components, parts, attachments and accessories specially designed for such equipment.

9A101 Lightweight turbojet and turbofan engines (including turbocompound engines) usable in “missiles”, other than those controlled by 9A001, as follows (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1

AT applies to entire entry

AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value

Related Controls: 9A101.b controls only engines for non-military unmanned air vehicles [UAVs] or remotely piloted vehicles [RPVs], and does not control other engines designed or modified for use in "missiles", which are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items:

a. Engines having both of the following characteristics:

a.1. Maximum thrust value greater than 400 N (achieved un-installed) excluding civil certified engines with a maximum thrust value greater than 8,890 N (achieved un-installed), *and*

a.2. Specific fuel consumption of 0.15 kg/N/hr or less (at maximum continuous power at sea level static and standard conditions); *or*

b. Engines designed or modified for use in "missiles", regardless of thrust or specific fuel consumption.

9A104 Sounding rockets, capable of a range of at least 300 km. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A105 Liquid propellant rocket engines. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A106 Systems or components, other than those controlled by 9A006, usable in "missiles", as follows (see List of Items Controlled), and specially designed for liquid rocket propulsion systems.

License Requirements

Reason for Control: MT, AT

Control(s)

Country Chart

MT applies to entire entry

MT Column 1

AT applies to entire entry

AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Equipment and components in number; parts and accessories in \$ value

Related Controls: Items described in 9A106.a, .b, and .c are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121).

Related Definitions: N/A

Items:

a. Ablative liners for thrust or combustion chambers;

b. Rocket nozzles;

c. Thrust vector control sub-systems;

Technical Note: *Examples of methods of achieving thrust vector control controlled by 9A106.c includes:*

1. *Flexible nozzle;*
2. *Fluid or secondary gas injection;*
3. *Movable engine or nozzle;*
4. *Deflection of exhaust gas steam (jet vanes or probes); or*
5. *Thrust tabs.*

d. Liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments of more than 10 g rms between 20 Hz and 2000 Hz.

Note: *The only servo valves and pumps controlled by 9A106.d, are the following:*

- a. *Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7 Mpa or greater, that have an actuator response time of less than 100 ms;*
- b. *Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 rpm or with discharge pressures equal to or greater than 7 Mpa.*

e. Flight control servo valves designed or modified for use in “missiles” and designed or modified to operate in a vibration environment of more than 10g RMS over the entire range between 20Hz and 2 kHz.

9A107 Solid propellant rocket engines, usable in rockets with a range capability of 300 Km or greater, other than those controlled by 9A007, having total impulse capacity of 0.841 Mns or

greater. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A108 Solid rocket propulsion components, other than those controlled by 9A008, usable in rockets with a range capability of 300 Km or greater. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A109 Hybrid rocket motors, usable in rockets with a range capability of 300 Km or greater, other than those controlled by 9A009, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A110 Composite structures, laminates and manufactures thereof, other than those controlled by entry 9A010, specially designed for use in “missiles” or the subsystems controlled by entries 9A005, 9A007, 9A105.a, 9A106 to 9A108, 9A116, or 9A119.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled*Unit:* Kilograms*Related Controls:* 1.) See also 1A002. 2.)

“Composite structures, laminates, and manufactures thereof, specially designed for use in missile systems are under the licensing authority of the Directorate of Defense Trade Controls, U.S. Department of State, except those specially designed for non-military unmanned air vehicles controlled in 9A012.

Related Definitions: N/A*Items:*

The list of items controlled is contained in the ECCN heading.

9A111 Pulse jet engines, usable in “missiles”, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A115 Apparatus, devices and vehicles, designed or modified for the transport, handling, control, activation and launching of “missiles”. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A116 Reentry vehicles, usable in “missiles”,

and equipment designed or modified therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A117 Staging mechanisms, separation mechanisms, and interstages therefor, usable in “missiles”. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A118 Devices to regulate combustion usable in engines which are usable in rockets with a range capability greater than 300 Km or greater, controlled by 9A011 or 9A111. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A119 Individual rocket stages, usable in rockets with a range capability greater than 300 Km or greater, other than those controlled by 9A005, 9A007, 9A009, 9A105, 9A107 and 9A109. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A980 Nonmilitary mobile crime science laboratories; and parts and accessories, n.e.s.

License Requirements*Reason for Control:* CC*Control(s)**Country Chart*

CC applies to entire entry CC Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9A990 Diesel engines, n.e.s., and tractors and specially designed parts therefor, n.e.s.

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry AT Column 1
except 9A990.a

AT applies to 9A990.a only AT Column 2

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

a. Diesel engines, n.e.s., for trucks, tractors, and automotive applications of continuous brake horsepower of 400 BHP (298 kW) or greater (performance based on SAE J1349 standard conditions of 100 Kpa and 25°)

b. Off highway wheel tractors of carriage capacity 9 mt (20,000 lbs) or more; and parts and accessories, n.e.s.

c. On-Highway tractors, with single or tandem rear axles rated for 9 mt per axel (20,000 lbs.) or greater and specially designed parts.

9A991 "Aircraft", n.e.s., and gas turbine engines not controlled by 9A001 or 9A101 and parts and components, n.e.s.

License Requirements

Reason for Control: AT, UN

Control(s) *Country Chart*

AT applies to entire entry AT Column 1

UN applies to 9A991.a Rwanda

● **License Requirement Notes:** There is no de minimis level for foreign-made aircraft described by this entry that incorporate Commercial Standby Instrument Systems (CSIS) that integrate QRS11-00100-100/101 Micromachined Angular Rate Sensors (see §734.4(a) of the EAR).

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

● *Related Controls:* QRS11 Micromachined Angular Rate Sensors are subject to the export

licensing jurisdiction of the U.S. Department of State, Directorate of Defense Trade Controls, unless the QRS11-00100-100/101 is integrated into and included as an integral part of a CSIS of the type described in ECCN 7A994 or aircraft of the type described in ECCN 9A991 that incorporates a CSIS that has such a sensor integrated, or is exported solely for integration into such a system. (See 22 CFR Part 121.) In the latter case, such items are subject to the licensing jurisdiction of the Department of Commerce. Technology specific to the development and production of QRS11 sensors remains subject to the licensing jurisdiction of the Department of State.

Related Definitions: N/A

Items:

a. Military aircraft, demilitarized (not specifically equipped or modified for military operation), as follows:

a.1. Cargo, "C-45 through C-118" inclusive, and "C-121,"

a.2. Trainers, bearing a "T" designation and using piston engines,

a.3. Utility, bearing a "U" designation and using piston engines,

a.4. Liaison, bearing an "L" designation, and

a.5. Observation, bearing an "O" designation and using piston engines;

b. Civil aircraft; *and*

Note: *Specify make and model of aircraft and type of avionics equipment on aircraft.*

c. Aero gas turbine engines, and specially designed parts therefor.

Note: *9A991.c does not control aero gas turbine engines that are destined for use in civil*

"aircraft" and that have been in use in bona fide civil "aircraft" for more than eight years.

d. Aircraft parts and components, n.e.s.

e. Pressurized aircraft breathing equipment, n.e.s.; *and* specially designed parts therefor, n.e.s.

9A992 Complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use.

License Requirements

Reason for Control: AT

Control(s)

Country Chart

AT applies to entire entry

AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

9B001 Specially designed equipment, tooling and fixtures, as follows (see List of Items Controlled), for manufacturing gas turbine blades, vanes or tip shroud castings.

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 1

MT applies only to equipment MT Column 1
for engines that meet the
characteristics described in
9A001

AT applies to entire entry AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

LVS: \$5000, except N/A for MT

GBS: Yes, except N/A for MT

CIV: Yes, except N/A for MT

List of Items Controlled

Unit: \$ value

Related Controls: For specially designed production equipment of systems, sub-systems and components controlled by 9A005 to 9A009, 9A011, 9A101, 9A105 to 9A109, 9A111, and 9A116 to 9A119 usable in “missiles” see 9B115. See also 9B991.

Related Definitions: N/A

Items:

a. Directional solidification or single crystal casting equipment;

b. Ceramic cores or shells.

9B002 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for the

“development” of gas turbine engines, assemblies or components incorporating “technologies” controlled by 9E003.a.

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 1

MT applies only to equipment MT Column 1
for engines that meet the
characteristics described in
9A001

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$3000, except N/A for MT

GBS: Yes, except N/A for MT

CIV: Yes, except N/A for MT

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9B003 Equipment specially designed for the “production” or test of gas turbine brush seals designed to operate at tip speeds exceeding 335 m/s, and temperatures in excess of 773 K (500°C), and specially designed components or accessories therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 1
 MT applies only to equipment MT Column 1
 for engines that meet the
 characteristics described in
 9A001

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$5000, except N/A for MT
 GBS: Yes, except N/A for MT
 CIV: Yes, except N/A for MT

List of Items Controlled

Unit: \$ value
Related Controls: See also 9B115
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

9B004 Tools, dies or fixtures for the solid state joining of “superalloy”, titanium or intermetallic airfoil-to-disk combinations described in 9E003.a.3 or 9E003.a.6 for gas turbines.

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 1

MT applies only to equipment MT Column 1
 for engines that meet the
 characteristics described in
 9A001

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$3000, except N/A for MT
 GBS: Yes, except N/A for MT
 CIV: Yes, except N/A for MT

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

9B005 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for use with any of the following wind tunnels or devices (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 1

AT applies to entire entry AT Column 1

License Exceptions

LVS: N/A
 GBS: N/A
 CIV: N/A

List of Items Controlled

Unit: \$ value
Related Controls: See also 9B105
Related Definitions: N/A
Items:

a. Wind tunnels designed for speeds of Mach 1.2 or more, except those specially designed for educational purposes and having a test section size (measured laterally) of less than 250 mm;

Technical Note: *Test section size in 9B005.a means the diameter of the circle, or the side of the square, or the longest side of the rectangle, at the largest test section location.*

b. Devices for simulating flow-environments at speeds exceeding Mach 5, including hot-shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns; *or*

c. Wind tunnels or devices, other than two-dimensional sections, capable of simulating Reynolds number flows exceeding 25×10^6 .

9B006 Acoustic vibration test equipment capable of producing sound pressure levels of 160 Db or more (referenced to 20 uPa) with a rated output of 4 kW or more at a test cell temperature exceeding 1,273 K (1,000°C), and specially designed quartz heaters therefor.

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 2
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: \$3000

GBS: Yes

CIV: Yes

List of Items Controlled

Unit: Number

Related Controls: See also 9B106. Note that some items in 9B006 may also be controlled under 9B106.

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9B007 Equipment specially designed for inspecting the integrity of rocket motors using non-destructive test (NDT) techniques other than planar X-ray or basic physical or chemical analysis.

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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MT applies to entire entry	MT Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9B008 Transducers specially designed for the direct measurement of the wall skin friction of

the test flow with a stagnation temperature exceeding 833 K (560°C).

AT applies to entire entry

AT Column 1

License Requirements

Reason for Control: NS, AT

Control(s)

Country Chart

NS applies to entire entry

NS Column 2

AT applies to entire entry

AT Column 1

License Exceptions

LVS: \$5000

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9B009 Tooling specially designed for producing turbine engine powder metallurgy rotor components capable of operating at stress levels of 60% of ultimate tensile strength (UTS) or more and metal temperatures of 873 K (600°C) or more.

License Requirements

Reason for Control: NS, AT

Control(s)

Country Chart

NS applies to entire entry

NS Column 2

License Exceptions

LVS: \$5000

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9B105 Wind tunnels for speeds of Mach 0.9 or more, usable for “missiles” and their subsystems.

License Requirements

Reason for Control: MT, AT

Control(s)

Country Chart

MT applies to entire entry

MT Column 1

AT applies to entire entry

AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: See also 9B005

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9B106 Environmental chambers and anechoic chambers, as follows (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Environmental chambers capable of simulating all of the following flight conditions:

a.1. Vibration environments of 10 g RMS or greater between 20 Hz and 2,000 Hz imparting forces of 5 kN or greater; *and*

a.2. Any of the following:

a.2.a. Altitude of 15,000 m or greater;
or

a.2.b. Temperature range of at least 223 K (-50° C) to 398 K (+125° C);

b. Anechoic chambers capable of simulating all of

the following flight conditions:

b.1. Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 2×10^{-5} N/m²) or with a rated power output of 4kW or greater; *and*

b.2. Any of the following:

b.2.a. Altitude of 15,000 m or greater;
or

b.2.b. Temperature range of at least 223K (-50° C) to 398 K (+125° C).

9B115 Specially designed “production equipment” for the systems, sub-systems and components controlled by 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Equipment in number; components in \$ value

Related Controls: Although items described in ECCNs 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109; 9A111, 9A116 to 9A119 are subject to the export licensing authority of the Department of State, Office of Defense Trade

Controls (22 CFR part 121), the “production equipment” controlled in this entry that is related to these items is subject to the export licensing authority of BIS.

Related Definitions: NA.

Items:

The list of items controlled is contained in the ECCN heading.

9B116 Specially designed “production facilities” for the systems, sub-systems, and components controlled by 9A004 to 9A009, 9A011, 9A012, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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MT applies to entire entry	MT Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Equipment in number; components in \$ value

Related Controls: Although items described in ECCNs 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109; 9A111, 9A116 to 9A119 are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls (22 CFR part 121), the “production equipment” controlled in this entry that is related to these items is subject to the export licensing authority of BIS.

Related Definitions: NA

Items:

The list of items controlled is contained in the ECCN heading.

9B117 Test benches and test stands for solid or liquid propellant rockets or rocket motors, having either of the following characteristics (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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MT applies to entire entry	MT Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: See also 9B990

Related Definitions: N/A

Items:

a. The capacity to handle more than 90 Kn of thrust; *or*

b. Capable of simultaneously measuring the three axial thrust components.

9B990 Vibration test equipment and specially designed parts and components, n.e.s.

License Requirements

Reason for Control: AT

CIV: N/A

*Control(s)**Country Chart***List of Items Controlled**

AT applies to entire entry

AT Column 1

Unit: \$ value*Related Controls:* N/A*Related Definitions:* N/A*Items:***License Exceptions**

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled*Unit:* \$ value*Related Controls:* N/A*Related Definitions:* N/A*Items:*

The list of items controlled is contained in the ECCN heading.

a. Automated equipment using non-mechanical methods for measuring airfoil wall thickness;

b. Tooling, fixtures or measuring equipment for the “laser”, water jet or ECM/EDM hole drilling processes controlled by 9E003.c;

c. Ceramic core leaching equipment;

d. Ceramic core manufacturing equipment or tools;

e. Ceramic shell wax pattern preparation equipment;

f. Ceramic shell burn out or firing equipment.

C. MATERIALS

9B991 Specially designed equipment, tooling or fixtures, not controlled by 9B001, as described in the List of Items Controlled, for manufacturing or measuring gas turbine blades, vanes or tip shroud castings.

License Requirements*Reason for Control:* AT*Control(s)**Country Chart*

AT applies to entire entry

AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

9C110 Resin impregnated fiber prepreps and metal coated fiber preforms therefor, for composite structures, laminates and manufactures specified in 9A110, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements having a specific tensile strength greater than 7.62×10^4 m and a specific modulus greater than 3.18×10^6 m.

License Requirements*Reason for Control:* MT, AT*Control(s)**Country Chart*

MT applies to entire entry	MT Column 1	for equipment controlled by 9A106.a and .b, or 9B116 for MT reasons
AT applies to entire entry	AT Column 1	

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

AT applies to entire entry AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

List of Items Controlled

Unit: Kilograms
Related Controls: 1.) See also 1C010 and 1C210.c. 2.) The only resin impregnated fiber prepreps controlled by entry 9C110 are those using resins with a glass transition temperature (T_g), after cure, exceeding 418 K (145 °C) as determined by ASTM D4065 or national equivalents.
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

9D001 “Software” specially designed or modified for the “development” of equipment or “technology” controlled by 9A (except 9A018, 9A990 or 9A991), 9B (except 9B990 or 9B991) or 9E003.

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to “software” for items controlled by 9A001 to 9A003, 9A012, 9B001 to 9B009, 9E003	NS Column 1

MT applies to “software”	MT Column 1
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License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: \$ value
Related Controls: 1.) “Software” “required” for the “development” of items controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 2.) “Software” “required” for the “development” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

9D002 “Software” specially designed or modified for the “production” of equipment controlled by 9A (except 9A018, 9A990, or 9A991) or 9B (except 9B990 or 9B991).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to “software” for equipment controlled by 9A001 to 9A003, 9A012, 9B001 to 9B009, or 9E003

NS Column 1

controlled by 9B (except 9B990 or 9B991), as follows (see List of Items Controlled).

License Requirements

MT applies to “software” for equipment controlled by 9B116 for MT reasons

MT Column 1

Reason for Control: NS, MT, AT

Control(s)

Country Chart

AT applies to entire entry

AT Column 1

NS applies to “software” for “use” of FADEC for equipment controlled by 9A001 to 9A003

NS Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A

TSR: N/A

MT applies to “software” required for the “use” of FADEC for gas turbine engines controlled by 9A101, 9A106, or 9A110

MT Column 1

AT applies to entire entry

AT Column 1

List of Items Controlled

Unit: \$ value

Related Controls: 1.) “Software” “required” for the “production” of items controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 2.) “Software” “required” for the “production” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9D003 “Software” specially designed or modified for the “use” of full authority digital electronic engine controls (FADEC) for propulsion systems controlled by 9A (except 9A018, 9A990 or 9A991) or equipment

License Exceptions

CIV: Yes, except N/A for MT

TSR: Yes, except N/A for MT

List of Items Controlled

Unit: \$ value

Related Controls: 1.) See also 9D103. 2.) “Software” “required” for the “use” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)

Related Definitions: N/A

Items:

a. “Software” in digital electronic controls for propulsion systems, aerospace test facilities or air breathing aero-engine test facilities;

b. Fault-tolerant “software” used in “FADEC” systems for propulsion systems and associated test

facilities.

control.

9D004 Other “software”, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

- a. 2D or 3D viscous “software” validated with wind tunnel or flight test data required for detailed engine flow modelling;
- b. “Software” for testing aero gas turbine engines, assemblies or components, specially designed to collect, reduce and analyze data in real time, and capable of feedback control, including the dynamic adjustment of test articles or test conditions, as the test is in progress;
- c. “Software” specially designed to control directional solidification or single crystal casting;
- d. “Software” in “source code”, “object code” or machine code required for the “use” of active compensating systems for rotor blade tip clearance

Note: 9D004.d does not control “software” embedded in uncontrolled equipment or required for maintenance activities associated with the calibration or repair or updates to the active compensating clearance control system.

9D018 “Software” for the “use” of equipment controlled by 9A018.

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and .b	RS Column 2
AT applies to entire entry	AT Column 1
UN applies to entire entry	Rwanda

License Exceptions

CIV: N/A
TSR: Yes for Australia, Japan, New Zealand, and NATO only

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

9D101 “Software” specially designed or modified for the “use” of commodities controlled by 9B105, 9B106, 9B116, or 9B117.

License Requirements*Reason for Control:* MT, AT*Control(s)* *Country Chart*

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled*Unit:* \$ value*Related Controls:* N/A*Related Definitions:* N/A*Items:*

The list of items controlled is contained in the ECCN heading.

9D103 “Software” specially designed for modelling, simulation or design integration of “missiles”, or the subsystems controlled by 9A005, 9A007, 9A105.a, 9A106, 9A108, 9A116 or 9A119. (This entry is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9D104 “Software” specially designed and modified for the “use” of equipment controlled by 9A001, 9A005, 9A006.d, 9A006.g, 9A007.a, 9A008.d, 9A009.a, 9A010.d, 9A011, 9A012 (for MT controlled items only), 9A101, 9A105, 9A106.c and .d, 9A107, 9A108.c, 9A109, 9A111, 9A115.a, 9A116.d, 9A117, or 9A118.

License Requirements*Reason for Control:* MT, AT*Control(s)**Country Chart*

MT applies to entire entry

MT Column 1

AT applies to entire entry

AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled*Unit:* \$ value

Related Controls: “Software” for commodities controlled by 9A005 to 9A011, 9A105, 9A106.c, 9A107 to 9A109, 9A111, 9A115, 9A116, 9A117, and 9A118 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A*Items:*

The list of items controlled is contained in the ECCN heading.

9D105 “Software” that coordinates the function of more than one subsystem, specially designed or modified for “use” in “missiles.” (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9D990 “Software”, n.e.s., for the “development” or “production” of equipment controlled by 9A990 or 9B990.

License Requirements*Reason for Control:* AT*Control(s)**Country Chart*

AT applies to “software”
for equipment under
9A990 except 9A990.a

AT Column 1

The list of items controlled is contained in the
ECCN heading.

AT applies to “software”
for equipment under
9A990.a only

AT Column 2

E. TECHNOLOGY

Note: “Development” or “production”
“technology” controlled by 9E001 to 9E003 for
gas turbine engines remains controlled when used
as “use” “technology” for repair, rebuild and
overhaul. Excluded from control are: technical
data, drawings or documentation for maintenance
activities directly associated with calibration,
removal or replacement of damaged or
unserviceable line replaceable units, including
replacement of whole engines or engine modules.
**9E001 “Technology” according to the General
Technology Note for the “development” of
equipment or “software” controlled by
9A001.c, 9A004 to 9A011, 9B (except 9B990 or
9B991), or 9D (except 9D990 or 9D991).**

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the
ECCN heading.

License Requirements

Reason for Control: NS, MT, AT

**9D991 “Software”, for the “development” or
“production” of equipment controlled by
9A991 or 9B991.**

Control(s)

Country Chart

License Requirements

Reason for Control: AT

NS applies to “technology” NS Column 1
for items controlled by
9A001.c, 9B001 to 9B009,
9D001 to 9D004

Control(s)

Country Chart

AT applies to entire entry

AT Column 1

MT applies to “technology” MT Column 1
for items controlled by
9B001, 9B002, 9B003,
9B004, 9B005, 9B007,
9B105, 9B106, 9B116,
9B117, 9D001, 9D002,
9D003, and 9D004
for MT reasons

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

AT applies to entire entry AT Column 1

License Requirement Notes: See §743.1 of
the EAR for reporting requirements for exports
under License Exceptions.

License Exceptions

CIV: N/A

TSR: N/A

damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules.

Items:

List of Items Controlled

Unit: N/A

Related Controls: 1.) See also 9E101 and 1E002.f (for controls on “technology” for the repair of controlled structures, laminates or materials). 2.) The “technology” required for the “development” of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 3.) “Technology”, required for the “development” of equipment or “software” subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls, is also subject to the same licensing jurisdiction. (See 22 CFR part 121).

Related Definitions: “Development” or “production” “technology” controlled by 9E for gas turbine engines remains controlled when used as “use” “technology” for repair, rebuild and overhaul. Excluded from control are: technology, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of

The list of items controlled is contained in the ECCN heading.

9E002 “Technology” according to the General Technology Note for the “production” of equipment controlled by 9A001.c, 9A004 to 9A011 or 9B (except 9B990 or 9B991).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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MT applies to “technology” MT Column 1 for equipment controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B105, 9B106, 9B116, and 9B117 for MT reasons

AT applies to entire entry	AT Column 1
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License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: N/A

Related Controls: 1.) See also 9E102. 2.) See

also 1E002.f for “technology” for the repair of controlled structures, laminates or materials. 3.) The “technology” required for the “development” of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 4.) “Technology”, required for the “development” of equipment or “software” subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls, is also subject to the same licensing jurisdiction. (See 22 CFR part 121).

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9E003 Other “technology”, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, SI, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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SI applies to 9E003.a.1 through a.11, and h. See §742.14 of the EAR for additional information.

AT applies to entire entry	AT Column 1
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License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: N/A

Related Controls: 1.) Hot section “technology” specifically designed, modified, or equipped for military uses or purposes, or developed principally with U.S. Department of Defense funding, is subject to the licensing authority of the U.S. Department of State. 2.) “Technology” is subject to the EAR when actually applied to a commercial aircraft engine program. Exporters may seek to establish commercial application either on a case-by-case basis through submission of documentation demonstrating application to a commercial program in requesting an export

license from the Department Commerce in respect to a specific export, or in the case of use for broad categories of aircraft, engines, or components, a commodity jurisdiction determination from the Department of State.

Related Definitions: N/A

Items:

a. “Technology” “required” for the “development”, “production” of any of the following gas turbine engine components or systems:

a.1. Gas turbine blades, vanes or tip shrouds made from directionally solidified (DS) or single crystal (SC) alloys having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000°C) at a stress of 200 MPa, based on the average property values;

a.2. Multiple domed combustors operating at average burner outlet temperatures exceeding 1,813 K (1,540° C) or combustors incorporating thermally decoupled combustion liners, non-metallic liners or non-metallic shells;

a.3. Components manufactured from any of the following:

a.3.a. Organic “composite” materials designed to operate above 588 K (315°C);

a.3.b. Metal “matrix” “composite”, ceramic “matrix”, intermetallic or intermetallic reinforced materials controlled by 1C007; or

a.3.c. “Composite” material controlled by 1C010 and manufactured with resins controlled by 1C008.

a.4. Uncooled turbine blades, vanes, tip-shrouds or other components designed to operate at gas path temperatures of 1,323 K (1,050°C) or more;

a.5. Cooled turbine blades, vanes or tip-shrouds, other than those described in

9E003.a.1, exposed to gas path temperatures of 1,643 K (1,370°C) or more;

a.6. Airfoil-to-disk blade combinations using solid state joining;

a.7. Gas turbine engine components using “diffusion bonding” “technology” controlled by 2E003.b;

a.8. Damage tolerant gas turbine engine rotating components using powder metallurgy materials controlled by 1C002.b;

a.9. Full authority digital electronic engine control (FADEC) for gas turbine and combined cycle engines and their related diagnostic components, sensors and specially designed components;

a.10. Adjustable flow path geometry and associated control systems for:

a.10.a. Gas generator turbines;

a.10.b. Fan or power turbines;

a.10.c. Propelling nozzles; or

Note 1: . Adjustable flow path geometry and associated control systems in 9E003.a.10 do not include inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.

Note 2: 9E003.a.10 does not control “development” or “production” “technology” for adjustable flow path geometry for reverse thrust.

a.11. Wide chord hollow fan blades without part-span support;

b. “Technology” “required” for the “development” or “production” of any of the following:

b.1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; *or*

b.2. “Composite” propeller blades or propfans capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;

c. “Technology” “required” for the “development” or “production” of gas turbine engine components using “laser”, water jet, ECM or EDM hole drilling processes to produce holes having any of the following sets of characteristics:

c.1. All of the following:

c.1.a. Depths more than four times their diameter;

c.1.b. Diameters less than 0.76 mm; *and*

c.1.c. Incidence angles equal to or less than 25°; *or*

c.2. All of the following:

c.2.a. Depths more than five times their diameter;

c.2.b. Diameters less than 0.4 mm; *and*

c.2.c. Incidence angles of more than 25°;

Technical Note: For the purposes of 9E003.c, incidence angle is measured from a plane tangential to the airfoil surface at the point where the hole axis enters the airfoil surface.

d. “Technology” “required” for the “development” or “production” of helicopter power transfer systems or tilt rotor or tilt wing “aircraft” power transfer systems;

e. “Technology” for the “development” or “production” of reciprocating diesel engine ground vehicle propulsion systems having all of the following:

e.1. A box volume of 1.2 m³ or less;

e.2. An overall power output of more than

750 kW based on 80/1269/EEC, ISO 2534 or national equivalents; *and*

e.3. A power density of more than 700 kW/m³ of box volume;

Technical Note: *Box volume: the product of three perpendicular dimensions measured in the following way:*

Length: The length of the crankshaft from front flange to flywheel face;

Width: The widest of the following:

a. The outside dimension from valve cover to valve cover;

b. The dimensions of the outside edges of the cylinder heads; or

c. The diameter of the flywheel housing;

Height: The largest of the following:

a. The dimension of the crankshaft center-line to the top plane of the valve cover (or cylinder head) plus twice the stroke; or

b. The diameter of the flywheel housing.

f. “Technology” “required” for the “production” of specially designed components, as follows, for high output diesel engines:

f.1. “Technology” “required” for the “production” of engine systems having all of the following components employing ceramics materials controlled by 1C007:

f.1.a. Cylinder liners;

f.1.b. Pistons;

f.1.c. Cylinder heads; *and*

f.1.d. One or more other components (including exhaust ports, turbochargers, valve guides, valve assemblies or insulated fuel injectors);

f.2. “Technology” “required” for the “production” of turbocharger systems, with single-stage compressors having all of the following:

f.2.a. Operating at pressure ratios of 4:1 or higher;

f.2.b. A mass flow in the range from 30 to 130 kg per minute; *and*

f.2.c. Variable flow area capability within the compressor or turbine sections;

f.3. “Technology” “required” for the “production” of fuel injection systems with a specially designed multifuel (e.g., diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8°C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8°C)), having both of the following:

f.3.a. Injection amount in excess of 230 mm³ per injection per cylinder; *and*

f.3.b. Specially designed electronic control features for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;

g. “Technology” “required” for the development” or “production” of high output diesel engines for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication, permitting operation to temperatures exceeding 723 K (450°C), measured on the cylinder wall at the top limit of travel of the top ring of the piston.

h. “Technology” not otherwise controlled in 9E003.a.1 through a.10 and currently used in the “development”, “production”, or overhaul of hot

section parts and components of civil derivatives of military engines controlled on the U.S. Munitions List.

controlled by 9A012, 9A101, 9A104 to 9A111, 9A115 to 9A119, 9D101, 9D103, 9D104 or 9D105.

License Requirements

Reason for Control: MT, AT

9E018 “Technology” for the “development”, “production”, or “use” of equipment controlled by 9A018.

Control(s) *Country Chart*

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Requirements

Reason for Control: NS, RS, AT, UN

Control(s) *Country Chart*

NS applies to entire entry NS Column 1

RS applies to 9A018.a and .b RS Column 2

AT applies to entire entry AT Column 1

UN applies to entire entry Rwanda

License Exceptions

CIV: N/A

TSR: N/A

License Exceptions

CIV: N/A

TSR: Yes for Australia, Japan, New Zealand, and NATO only

List of Items Controlled

Unit: N/A

Related Controls: “Technology” controlled by 9E101 for items in 9A012, 9A101.b, 9A104, 9A105, to 9A109, 9A110 that are specially designed for use in missile systems and subsystems, 9A111, 9A115, 9A116 to 9A119, 9D103, and 9D105 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items:

List of Items Controlled

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

The list of items controlled is contained in the ECCN heading.

9E101 “Technology” according to the General Technology Note for the “development” or “production” of commodities or software

9E102 “Technology” according to the General Technology Note for the “use” of space launch vehicles specified in 9A004, or commodities or software controlled by 9A005 to 9A012, 9A101, 9A104 to 9A111, 9A115 to 9A119, 9B105, 9B106, 9B115, 9B116, 9B117, 9D101, 9D103, 9D104 or 9D105.

License Requirements*Reason for Control:* AT

<i>Reason for Control:</i> MT, AT	<i>Control(s)</i>	<i>Country Chart</i>
<i>Control(s)</i>	<i>Country Chart</i>	
MT applies to entire entry	MT Column 1	AT applies to “technology” for equipment under 9A990 and 9B990 except 9A990.a
AT applies to entire entry	AT Column 1	AT applies to “technology” for equipment under 9A990.a only

License Exceptions

CIV: N/A
TSR: N/A

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled*Unit:* N/A

Related Controls: 1.) For the purpose of this entry, “use” “technology” is limited to items controlled for MT and their subsystems. 2.) “Technology” controlled by 9E102 for commodities or software subject to the export licensing jurisdiction of the Department of State in 9A004 to 9A012, 9A101.b, 9A104, 9A105, 9A106.a to .c, 9A107 to 9A109, 9A110 that are specially designed for use in missile systems and subsystems, 9A111, 9A115 to 9A119, 9B115, 9B116, 9D103, specified software in 9D104, and 9D105 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A*Items:*

The list of items controlled is contained in the ECCN heading.

9E990 “Technology”, n.e.s., for the “development” or “production” or “use” of equipment controlled by 9A990 or 9B990.

License Requirements**List of Items Controlled***Unit:* \$ value*Related Controls:* N/A*Related Definitions:* N/A*Items:*

The list of items controlled is contained in the ECCN heading.

9E991 “Technology”, for the “development”, “production” or “use” of equipment controlled by 9A991 or 9B991.

License Requirements*Reason for Control:* AT

<i>Control(s)</i>	<i>Country Chart</i>
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

9E993 Other “technology”, not described by 9E003, as follows (see List of Items Controlled).

License Requirements

Reason for Control: AT

Control(s)

Country Chart

AT applies to entire entry

AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

a. Rotor blade tip clearance control systems employing active compensating casing “technology” limited to a design and development data base; *or*

b. Gas bearing for turbine engine rotor assemblies.

EAR99 Items subject to the EAR that are *not* elsewhere specified in this CCL Category *or* in any other category in the CCL are designated by the number *EAR99*.